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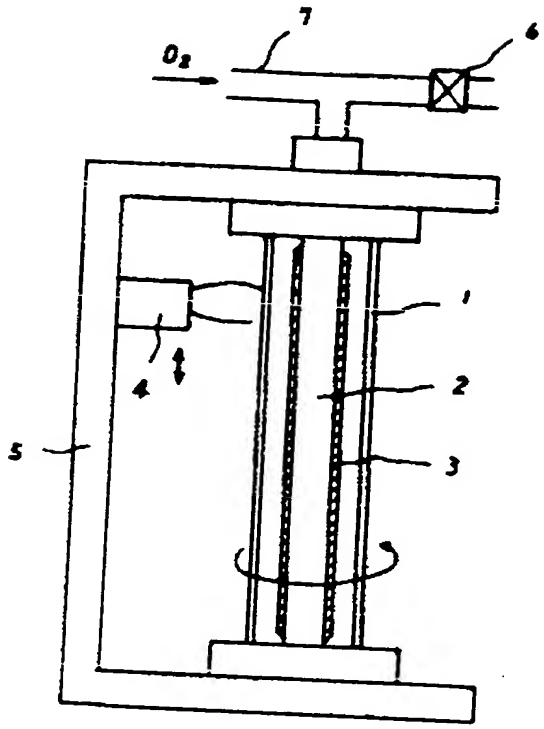
APPLICANT : HITACHI CABLE LTD;

INVENTOR : NIIZAWA MASAHARU;

INT.CL. : C03B 37/00 // G02B 5/14

TITLE : PRODUCTION OF OPTICAL FIBER PREFORM



ABSTRACT : PURPOSE: To produce an optical fiber preform by coating a core rod with a plastic film and by putting the coated rod into a glass tube to protect the rod from scratching when put into the tube and to prevent formation of air bubbles and disproportionation at the boundary in unifying the rod and tube by fusion.

CONSTITUTION: In production of an optical fiber preform by a rod-in-tube method, core rod 2 is coated with flexible urea resin film 3 of 5 μ thickness and put into glass tube 1. Cock 6 is closed, ixygen gas is fed from introduction pipe 7 at a rate of 1000 cc/min for 5 min, and oxyhydrogen burner 4 is lowered at a speed of about 60mm/min. Thus, the temp. of tube 1 is raised to about 200~500°C, and film 3 is removed thorougly. Cock 6 is then opened, the caloric force of burner 4 is strengthened, and burner 4 is elevated to unify tube 1 and rod 2 by fusion, giving an optical fiber preform.

⑲ 日本国特許庁（JP）　　⑪ 特許出願公開

⑫ 公開特許公報（A）　　昭55—3369

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（全 2 頁）

⑤4光ファイバプレフォームの製造法

⑳特　　願　昭53—76850
㉒出　　願　昭53(1978) 6月23日
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明　細　書

発明の名称　光ファイバプレフォームの製造法

特許請求の範囲

1. コアロッド2の表面の一部または全部に柔軟なプラスチック膜3をコーティングし、該コーティングしたコアロッド2をガラス管1内に挿入し、酸素ガス雰囲気で200～500℃に加熱して前記プラスチック膜3を除去し、さらに加熱してコアロッド2とガラス管1とを融着一体化することを特徴とする光ファイバプレフォームの製造法。

発明の詳細な説明

本発明はロッドインチューブ法を用いた光ファイバプレフォームの製造法に関するものである。

ロッドインチューブ法ではガラス管にコアロッドを挿入して製造するのであるが、内径を縮小したガラス管1にコアロッド2を挿入する際、ガラス管1の内面とコアロッド2が接触して双方にキズが生じ、融着時の境界面に気泡及び不均化が生じ光散乱損失の原因となる。

本発明の目的は、前記した従来技術の欠点を解消し、ロッドインチューブ法により低損失な光ファイバのプレフォームを製造する方法を提供することにある。

すなわち、その要旨は、挿入するコアロッド2の表面にあらかじめ、プラスチックコーテングを施しておき、内径を縮小したガラス管1内に挿入する時にガラス管1の内面とコアロッド2の表面に傷をつけることなく挿入し、その後、酸素ガス雰囲気内でプラスチックコーテングを加熱除去したのち、溶融一体化して低損失な光ファイバのプレフォームを製造するものである。

プラスチックコーテング材としては、尿素，樹脂，ナイロン系樹脂，ポリエチレン等C，N，O，Hの原子からできているものが適当であり、これらの樹脂を10μ以下にコーテングすることが望ましく、樹脂の加熱除去温度は200～500℃がよい。

本発明の構成を、一実施例を示す図面を参照して具体的に説明する。

コアロッド2に柔軟な尿素樹脂膜3を5μの厚さにコーテングし、ガラス管1に挿入する。コック6を閉じ、酸素ガス導入管7より酸素ガス1000cc/分を約5分間流した後、酸水素バーナ4を上から下の約60㎜/分の速度で下げる。ガラス管1の温度は約200～500℃である。この操作により尿素樹脂膜3は完全に除去される。ガラス管1の温度が500℃より高いと樹脂より発生したH₂O等がガラス管1またはコアロッド2に混入するので、上記温度が最適である。しかる後、コック6を開き、酸水素バーナ4の火力を上げ下から上へ移動させ、ガラス管1とコアロッド2を溶着一体化し、光ファイバプレフォームを得る。この際、酸素ガスは流したままにしておくとよい。5はガラス旋盤である。

コアロッド2を挿入する際特にコアロッド2の先端がガラス管1内面に触れることが多いので、コアロッド3の先端だけ部分的にプラスチックコートしても良い。除去方法は前記実施例に準ずる。

本発明の製造方法によれば次のような顕著な効果を奏する。

(1) コアロッドの表面が柔軟なプラスチックでコーテングされているので、ガラス管内にコアロッドを挿入する際、接触によつてガラス管の内面やコアロッドの表面に傷をつけることがない。

(2) 傷がつかないため、プレフォームのコアとガラス管との界面に気泡が生じることがなく、光散乱が発生せず、低損失な光ファイバのプレフォームを得ることができる。

(3) コアロッドの表面にプラスチックがコーテングされているので、コアロッドの保存にも便利である。

図面の簡単な説明

図は本発明の一実施例を示す説明図である。

1：ガラス管、2：コアロッド、3：プラスチック膜、4：酸水素バーナ、5：ガラス旋盤、6：コック、7：酸素ガス導入管。

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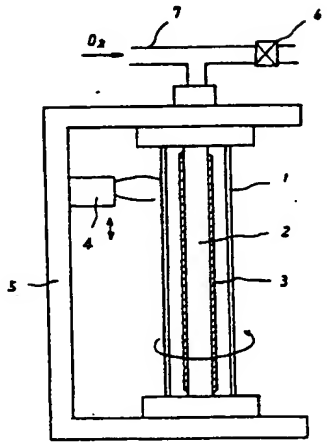

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(11) Patent Application Disclosure No.: **55-3369 (1980)**

(43) Disclosure Date: January 11, 1980

(51) Int.Cl^3 Identification Symbol

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Number of Invention: 1

Search Request: Made

(Total page: 2)

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(54) **Manufacturing Method of Optical Fiber Preform**

(21) Application Number : 53-76850 (1978)

(22) Application Date: **June23, 1978**

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(71) Applicant: Hitachi Cable K K

(74) Agent, Attorney: F. Sato

DETAILED DESCRIPTION

Subject of Invention

Manufacturing method of optical fiber preform

Scope of the Patent Claim

1. A manufacturing method of optical fiber preform having the following characteristics: To a portion or all of the surface of the core rod 2, the soft plastic film 3 is coated; the coated core rod 2 is inserted into the glass tube 1 and the assembly is heated in an oxygen gas atmosphere at 200-500°C to remove the aforementioned plastic film 3; it is further heated to fuse the core rod and the tube 1 into one body.

Detailed Explanation of the Invention

The present invention is related to a manufacturing method of optical fiber preform using the rod-in-tube method.

In the rod-in-tube method, the manufacturing is carried out by inserting the core rod into a glass tube. However, if the core rod 2 is to be inserted into the glass tube 1 which has been shrunk for the inside diameter, the inside surface of the glass tube 1 and the core rod 2 would contact each other to form scratches on both sides which would cause formation of bubbles and heterogeneity in the boundary face during the fusion of the rod and tube, and this would cause light scattering loss.

The objective of the present invention is to eliminate the defect of aforementioned conventional technology to provide a manufacturing method of preform for optical fiber which would be low in loss based on the rod-in-tube method.

Namely, the essence is that to the surface of the core rod 2 to be inserted, a plastic coating is applied beforehand so that no scratch would be formed on the inside surface of

the glass tube 1 and the surface of the core rod 2 when the core rod 2 is inserted into the glass tube 1 which has been shrunk in the inside diameter. After this, the coating is heat-removed in an oxygen atmosphere; then the assembly is fused to become one body to manufacture a low loss optical fiber preform.

For the plastic coating material, urea resins, Nylon system resins, polyethylene, etc. composed of C, N, O, H atoms are suitable. It is desirable that these resins are coated under 10 um. The temperature for heat-removal of the resin is preferably 200—500°C.

The constitution of the present invention is concretely illustrated by referring to the figure below showing an implementation example.

To the core rod 2, the soft urea resin film 3 (5 um in thickness) was coated, and this is then inserted into the glass tube 1. The cock 6 was closed and oxygen gas was flowed from the oxygen gas introduction tube 7 at flow rate 1000 cc/min for about 5 minutes; then the oxyhydrogen burner 4 was lowered from top to bottom at moving speed of about 60 mm/min. The temperature of the glass tube 1 was about 200-500°C. By this operation, the urea resin film 3 was completely removed. If the temperature of the glass tube 1 is higher than 500°C, the H_2O generated from the resin would be contaminated into the glass tube 1 or the core rod 2; therefore, the aforementioned temperature range is most suitable.

After this, the cock 6 was opened and the flame heating power of the oxyhydrogen burner 4 was moved from the bottom tot the top to fuse the glass tube 1 and the core rod 2 into one body to obtain an optical fiber preform. During this, it is better to continue the oxygen gas flow as above. 5 is a glass lathe.

In the insertion of the core rod 2, the tip-end of the core rod 2 often contacts the inside surface of the glass tube 1; therefore, a partial plastic coating could be applied only to the tip-end of the core rod 2. The elimination of the coating would be also based on the aforementioned implementation example.

According to the manufacturing method of the present invention, the following drastic effect can be achieved.

(1) The surface of the core rod is coated with a soft plastic; thus during the insertion of the core rod into the glass tube, no scratch would be formed onto the inside surface of the glass tube or the surface of the core rod by contacting (in the insertion operation).

(2) Since no scratching would occur, no bubble would be formed at the boundary face of the core and the glass tube of the preform; therefore, no light scattering would occur; thus, a low loss optical fiber preform can be obtained.

(3) Since the surface of the core rod is coated with plastic, the storage of the core rod would become more convenient.

Brief Explanation of the Figure

The figure is an illustration diagram showing an implementation example of the present invention.

1...glass tube; 2..core rod; 3...plastic film; 4...oxyhydrogen burner; 5...glass lathe; 6...cock; 7..oxygen gas introduction tube.

Agent, Attorney: F. Sato

(attach the figure here)

(19) Japanese Patent Office (JP)

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(22) Application Date: June 23, 1978

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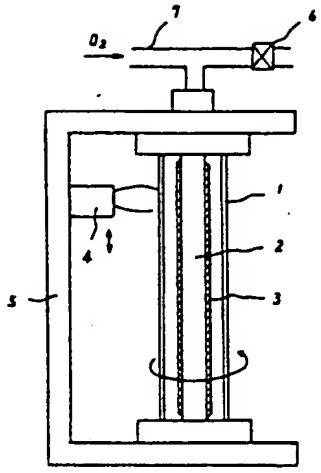
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